Date Submitted: July 27, 2018

Texmark Chemicals, Inc.

Location of Headquarters: Galena Park, Texas

Location of Biofuel Production Facility: Galena Park, Texas

Fuel Pathway Requested

Fuel	Feedstock	Production Process Technology	RIN D-Code Requested
Renewable Jet Fuel	Renewable diesel (derived from feedstocks approved under Pathway F of Table 1 to 80.1426)	Fractionation	4
Renewable Jet Fuel	Renewable diesel (derived from feedstocks approved pursuant to Pathway P of Table 1 to 80.1426)	Fractionation	5

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Table of Contents

B. Technical Justification 2

1. Fuel Pathway Description 2
2. Process Flow Charts 3
3. Comparison to Previously Evaluated Pathways 3
4. Commercial Viability 4
5. Renewable Fuel Production Volumes 5

C. Organization Information 7

1. Organization Description 7
2. Responsible Corporate Officer 8

D. Fuel Type 9

1. Technical Description 9
2. Information for New Fuel Types 9
3. Other Relevant Information 9

E. Production Process 9

1. Type of Production Process 9
2. Mass and Energy Balances 9
3. Historical Process Data 11
4. Information for New Production Processes 11
5. Other Relevant Information 11

F. Feedstock 12

1. Type of Feedstock 12
2. Information for New Feedstocks 12

G. Coproducts 12

1. Technical Description 12
2. Market Value 12
3. Coproducts Used as Livestock Feed 13

H. List of Attachments 13

B. Technical Justification

1. Fuel Pathway Description

Pursuant to 40 CFR 80.1426(c)(6), which directs parties seeking to produce a renewable fuel using another renewable fuel as a feedstock to pursue the petition process, Texmark Chemicals, Inc. ("Texmark") and Neste US, Inc. ("Neste") are petitioning EPA to approve a pathway for the production of renewable jet fuel from renewable diesel feedstock using the fractionation process. The fractionation process, also known as distillation, involves boiling renewable diesel feedstock to the jet fuel range and recovering the distillate, which includes both renewable jet fuel and renewable diesel. The proposed pathway is substantially identical to existing pathways for the production of renewable jet fuel via the hydrotreating process, and the chief difference is that Texmark and Neste propose to conduct the fractionation step of the hydrotreating process at a separate facility from where the renewable diesel feedstock was produced. Texmark and Neste intend to enter into a commercial agreement, with Neste acting as the exclusive renewable diesel feedstock supplier and Texmark serving as the renewable jet fuel producer.

While EPA has not previously examined renewable diesel specifically as a feedstock, the proposed pathway does not involve analysis of any new renewable biomass feedstocks for the production of the renewable diesel that will be used as a feedstock. Texmark and Neste seek approval to only use renewable diesel feedstock that was produced via currently approved pathways at Neste registered facilities. Specifically, Texmark and Neste seek approval of a pathway to generate biomass-based diesel (D-code 4) Renewable Identification Numbers ("RINs") for renewable jet fuel derived from renewable diesel that was produced from the following feedstocks currently approved for renewable diesel from the hydrotreating process under Pathway F of Table 1 of 40 CFR 80.1426: soybean oil, biogenic waste oils, fats, and greases ("biogenic waste FOGs"), distillers corn oil, algal oil, camelina sativa oil, and distillers sorghum oil.[1] Texmark and Neste also seek approval for a pathway to generate advanced biofuel (D-code 5) RINs for renewable jet fuel derived from renewable diesel produced from the following feedstocks currently approved for the production of renewable diesel by any process (including hydrotreating) under Pathway P of Table 1 of 40 CFR 80.1426: non-cellulosic portions of separated food waste and non-cellulosic components of annual cover crops.

The proposed fractionation process has been previously evaluated by EPA as a component of the hydrotreating process. Fractionation of renewable diesel will be conducted using grid electricity and steam from natural gas or other fossil sources, but not coal. The process will result in the production of both renewable jet (primary product) and renewable diesel (co-product). The renewable jet product is an approved blending component with conventional petroleum-derived jet fuels certified to the ASTM 7566 Annex A2 specification. The renewable diesel co-product is a complete drop-in for fossil diesel and meets both EN 15940:2016 and ASTM D975 for paraffinic diesel fuels.

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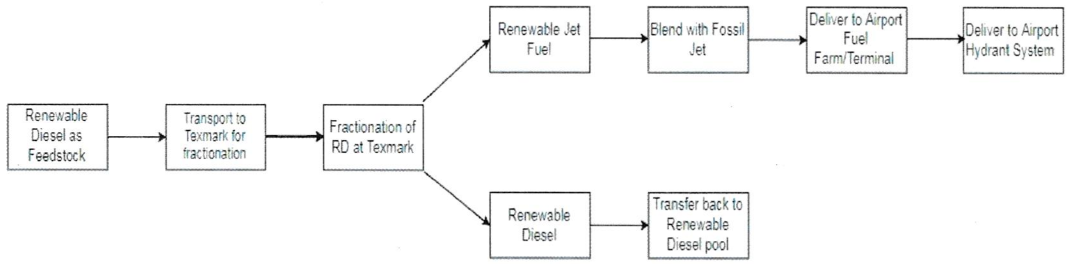
[1] Texmark and Neste's current commercialization plan is to produce renewable jet fuel from renewable diesel derived from biogenic waste FOGs, but Texmark and Neste also seek the flexibility to use any feedstock currently approved for producing renewable diesel from the hydrotreating process.

2. Process Flow Charts[2]



3. Comparison to Previously Evaluated Pathways

EPA has previously evaluated the production of renewable diesel and renewable jet from hydrotreating. Pathways F, H, L, and P of Table 1 to 40 CFR §80.1426 currently allow for the production of either renewable diesel or renewable jet via the hydrotreating process using a variety of feedstocks. The proposed pathway is nearly identical to these existing hydrotreating pathways, except that Texmark and Neste seek approval to use renewable diesel produced pursuant to several of these pathways as a feedstock to produce renewable jet fuel via fractionation at a separate facility.

Fractionation is a commonly recognized step in the larger hydrotreating process, and EPA has extensively evaluated the hydrotreating process as part of numerous pathway approvals, including in the March 2010 RFS rule, the March 2013 Pathways I rule, the July 2018 Grain Sorghum Oil rule, and several recent petition determinations. In the March 2010 RFS rule, EPA analyzed and approved pathways for renewable diesel produced from biogenic waste FOGs and other feedstocks through the hydrotreating process.[3] In the Pathways I rule, EPA specifically evaluated the hydrotreating process for the production of jet fuel. There, EPA conducted detailed process modeling using data representing an industry average hydrotreating production process maximized for diesel fuel output and the same process maximized for jet fuel output.[4] Based on this analysis, EPA approved the use of camelina oil to produce renewable diesel, jet fuel, naphtha, and LPG from the hydrotreating process, under either a maximum diesel or maximum jet fuel hydrotreating configuration. In that rulemaking, EPA also clarified that previously approved hydrotreating pathways for renewable diesel (including renewable diesel from soybean oil, oil from annual cover crops, algal oil, biogenic waste FOGs, and non-food grade corn oil) were also applicable to jet fuel. EPA has also evaluated hydrotreating as

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[2] *See* attached detailed process flow chart. This process flow chart applies to both fuel pathways requested. Texmark and Neste have not provided detailed flow for upstream renewable diesel feedstock production because the renewable diesel feedstock will be produced pursuant to existing Table 1 pathways.

[3] *See* Regulation of Fuels and Fuel Additives: Changes to the Renewable Fuel Standard Program, Final Rule. 75 Fed. Reg. 14670 (March 28, 2010).

[4] *See* Regulation of Fuels and Fuel Additive: Identification of Additional Qualifying Renewable Fuel Pathways Under the Renewable Fuel Standard Program, Final Rule. 78 Fed. Reg. 14190 (March 5, 2013).

part of pathway petition determinations for Renewable Energy Group's Geismar facility and for Diamond Green Diesel.[5]

EPA's March 2013 Pathways I rulemaking and subsequent analyses of hydrotreating have extensively relied on peer-reviewed journal articles and publicly available literature, and EPA's analysis of the mass and energy balance of hydrotreating has relied upon the data in Pearlson (2011).[6] That analysis specifically notes that fractionation/distillation is part of the hydrotreating process.[7] Thus, the proposed fractionation process has already been analyzed by EPA as part of its assessment of hydrotreating.

Accordingly, the key difference between the proposed pathway and existing pathways for renewable jet is that the fractionation step of the hydrotreating process would occur at a separate facility from the facility producing the renewable diesel feedstock.

4. Commercial Viability

Neste My Renewable Jet Fuel™ is a commercially ready product for the global aviation market and is a key component of Neste's "Green Hub" solution to decarbonize aviation. Approved by ASTM as a 50% blend, it has been tested by Neste on over 1,000 commercial flights since 2011. Further, Neste has announced a collaboration with Geneve Aeroport to replace 1% of annual jet fuel consumption with renewable jet fuel beginning in late 2018.[8] In the United States, Neste is pursuing numerous opportunities to offer Neste My Renewable Jet Fuel™ to U.S. airlines and airports. In late 2017 Neste announced a collaboration with American Airlines to explore opportunities to further reduce American's environmental footprint through use of Neste's renewable fuels, including Neste My Renewable Jet Fuel™.[9] Neste recently engaged in a partnership with Dallas Fort Worth International Airport (DFW) to advance DFW's carbon neutral achievements via sustainable products, with the primary objective to encourage and assist operating airlines to incorporate Neste My Renewable Jet Fuel™ into their supply chain.[10] Neste is actively pursuing additional business opportunities in the European and U.S. biofuels markets, which currently are the most attractive markets due to regulatory and tax incentives.

Commercial production of Neste My Renewable Jet Fuel™ does not require significant additional capital expenditures or construction of additional facilities. Rather, scaling of production volume

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[5] *See* February 2018 REG Geismar determination, available at https://www.epa.gov/sites/production/files/2018-02/documents/reg-geismar-deter-ltr-2018-02-23.pdf; April 2017 REG Geismar Determination, available at https://www.epa.gov/sites/production/files/2017-05/documents/reg-geismar-deter-ltr-2017-04-13.pdf; and October 2013 Diamond Green Diesel determination, available at https://www.epa.gov/sites/production/files/2015-08/documents/diamond-green-diesel-determination-ltr-10-13.pdf

[6] Pearlson, M., N. 2011. A Techno-Economic and Environmental Assessment of Hydroprocessed Renewable Distillate Fuels.

[7] *Id.* at 36.

[8] https://www.neste.com/fi/en/node/66673

[9] https://www.neste.com/fi/en/node/70329

[10] Neste/DFW Press Release, available at https://www.neste.com/neste-and-dallas-fort-worth-international-airport-dfw-are-collaborating-drive-sustainable-aviation

requires access to adequate fractionation capacity in order to upgrade Neste's existing renewable diesel supply. While Neste is exploring options that will allow for internal fractionation in the medium-term, which will require moderate capital investment, Neste is pursuing an agreement with Texmark as its fractionation partner to facilitate near-term production of Neste My Renewable Jet Fuel™ in the United States. Under the proposed agreement, Neste will provide raw materials (i.e. the renewable diesel raw material) while Texmark will conduct the fractionation process to produce renewable jet and renewable diesel.

5. Renewable Fuel Production Volumes

Neste has produced about 700,000 gallons of renewable jet fuel since 2011 with average heating value of 121.5K BTU/gallon, chiefly to support the over 1,000 commercial demonstration flights flown on Neste My Renewable Jet. Neste is currently the world's largest producer of renewable diesel, with roughly 900 million gallons (2.6 MT) of global distillate capacity at three production facilities in Finland, the Netherlands, and Singapore. Total distillate capacity will be increased to roughly 1 billion gallons (3 million tons) by 2020. Further, Neste is currently evaluating an expansion of its Singapore facility that would increase total worldwide capacity to over 1.3 billion gallons (4 MT) by 2022.[11] A final decision on expansion of the Singapore facility is expected by the end of 2018. Neste's worldwide production of renewable diesel for the last five years is outlined below.

Year	Neste RD Production (million gallons)
2013	643
2014	712
2015	790
2016	750
2017	854

Neste has set an ambitious internal for target for 20% of renewable product sales to come from areas outside of road traffic by 2020. Neste My Renewable Jet Fuel™ is an integral part of this target, and Neste plans to rapidly increase production in the near future, with total global production potential of up to Ex. 4 million gallons Ex. 4 by 2022.

Texmark and Neste's proposed partnership is a key component of Neste's strategy to enter the renewable jet fuel market in North America. Texmark and Neste currently plan to provide the below estimated North American volumes through at least 2022. Texmark's current distillation capacity is roughly Ex. 4 gallons, although capacity could be expanded in the future through process optimization, physical expansion, or both.

[11] *See* Neste Annual Report 2017, available at https://www.neste.com/en/corporate-info/news-media/material-uploads/annual-reports-0

Year	Texmark Renewable Jet Fuel Production (million gallons/year)
2019	Confidential Business Information Exemption 4
2020	
2021	
2022	
2023	
2024	
2025	
2026	
2027	
2028	

While the above production projections are based upon Texmark's fractionation capacity, Neste's current projections for worldwide and North American production of renewable jet fuel are below. These projections reflect the use of several global fractionation partners over the next several years, as well as planned internal Neste resources in 2022 and beyond. Although not directly relevant to this pathway petition, Neste's global projections demonstrate that this pathway could be replicated relatively quickly for additional facilities if demand for renewable jet fuel increases significantly. Further, approval of this pathway would facilitate Neste's longer term global volume projections by allowing for earlier market entry and uptake of renewable jet fuel. Accordingly, there is significant volume potential for this pathway.

Year	Neste Global Forecast (million gallons/year)	Europe	North America
2018	Confidential Business Information Exemption 4		
2019			
2020			
2021			

[12] Volumes beyond 2022 currently assume no capital investments or process optimization, but volumes could be increased as noted above.

2022	Confidential Business Information Exemption 4	Confidential Business Information Exemption 4	Confidential Business Information Exemption 4
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			

Although the above illustrative scenarios are based on Texmark and Neste's current projections for renewable jet fuel production, actual future renewable jet production volumes will depend on a number of market and regulatory factors. Texmark and Neste expect the regulatory treatment of renewable jet fuel as compared to renewable diesel fuel to be a key factor in ultimate production numbers. Key regulatory programs that may impact production of renewable jet fuel include the California Low Carbon Fuel Standard, the European Renewable Energy Directive, and the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Other market factors, including the price of conventional jet fuel, the status of tax incentives, and the ability to monetize other benefits of renewable jet fuel, including conventional air quality benefits, may also impact renewable jet fuel production volumes.

Given that renewable jet fuel and renewable diesel are closely related middle distillate fuels and production can be maximized for the production of either fuel, high and low-end renewable jet fuel scenarios will necessarily depend on the market attractiveness of producing renewable jet vs. renewable diesel. Under a high-end scenario with favorable regulatory and market conditions, Texmark could produce the Galena Park facility's fractionation capacity of 20.5 million gallons, or potentially higher if capital investments are made for process optimization or physical expansion. Globally, Neste could produce up to Ex. 4 gallons Ex. 4 of renewable jet by 2022 if a decision to expand Neste's Singapore facility is made at the end of 2018. In a low-end scenario where the combination of market and regulatory factors favors production of renewable diesel over renewable jet, Texmark and Neste may produce a relatively smaller amount of renewable jet fuel than reflected in the above tables, although Texmark and Neste will continue to produce significant volumes as Neste views development of the renewable jet fuel market as a long-term strategic priority.

C. Organization Information

1. Organization Description

Texmark Chemicals, Inc., a division of Chemical Exchange Industries, is a privately held chemical processing and manufacturing company. Texmark specializes in contract manufacturing and tolling of specialty and high volume chemicals to many of the world's leading chemical companies. Texmark's unique location in Houston on the Houston Ship Channel allows its customers access to feedstocks or their customers in North America and globally. Texmark is not currently registered under 40 CFR Part 80. More information can be found at Texmark.com. Texmark's address is as follows:

Texmark Chemicals, Inc.
900 Clinton Drive
Galena Park, Texas 77547

Neste is a refining and marketing company specializing in premium-quality, lower-emission traffic fuels. The company is the world's leading producer of renewable diesel made from renewable raw materials. Sustainability is deeply embedded in Neste's everyday business. Neste has been listed on the Dow Jones Sustainability Index eleven times and was ranked the second most sustainable company in the world on the January 2018 Global 100 List. In 2017, Neste's renewable products reduced GHG emissions by 8.3 million tons, and 76% of Neste's renewable fuel volume was produced from wastes and residues.

Neste has operations in 14 countries worldwide and employs some 5,000 people. In 2017, the company's net sales stood at EUR 13 billion. More information, including Neste's Annual Report and Sustainability Report can be found at Neste.com. Neste's North American operations are headquartered in Houston, Texas, at the following address:

Neste U.S. Inc
3040 Post Oak Blvd, Suite 1700
Houston, Texas 77056

Neste's renewable diesel production facilities are registered pursuant to 40 CFR Part 80 and have the following facility ID numbers:

Neste Oil Netherlands B.V.: 81333
Neste Oil Singapore PTe Ltd: 80327
Neste Renewable Fuels Oy: 80272

Under the contemplated agreement, Texmark will conduct the fractionation process at its Galena, Texas, facility to produce renewable jet and renewable diesel using Neste's renewable diesel feedstock. Neste will produce the renewable diesel feedstock and will remain in control of the feedstock until delivery to Texmark. After production of the fuel, Neste will retake ownership and market those fuels to U.S. customers.

2. Responsible Corporate Officer

Texmark Chemicals, Inc.
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D. Fuel Type

1. Technical Description

The fuel type is renewable jet fuel which is synthesized paraffinic kerosene made from hydroprocessed fatty acids esters and free fatty acids (HEFA) technology using biogenic waste FOGs and other feedstocks currently approved for renewable diesel production under Table 1 of 40 CFR §80.1426. Renewable jet fuel is an approved blending component with conventional petroleum-derived jet fuels certified to ASTM 7566 Annex A2 specification. The maximum concentration allowed to be blended in petroleum jet fuel is 50%. Chemically, this fuel consists mostly of normal and isoparaffins with relatively small amount of cycloparaffins and no aromatics.

2. Information for New Fuel Types

N/A (renewable jet fuel previously evaluated by EPA)

3. Other Relevant Information

N/A

E. Production Process

1. Type of Production Process

The production process for the renewable diesel feedstock involves the previously EPA approved hydrotreatment process as listed in Table 1 to 40 CFR 80.1416, in which the feed is catalytically treated with hydrogen gas under pressure. It involves the combination of the following chemical processes: feedstock pretreatment, hydrotreating which includes hydrodeoxygenation and isomerization.

Texmark will conduct fractionation of Neste's renewable diesel feedstock at its Galena Park, Texas, facility. Fractionation is the last step in the hydrotreating process and was evaluated as part of the approval for the hydrotreating process to produce both renewable diesel and jet fuel.[13] Fractionation involves boiling renewable diesel to jet fuel range and recovering the distillate. The two co-product streams consist of jet fuel range hydrocarbons (C_8 to C_{16}) and remaining renewable diesel range hydrocarbons (C_{15} to C_{18}). Fractionation is also needed to meet specification properties of density and flashpoint as well as improve final fuel quality.

2. Mass and Energy Balances

Although EPA has already evaluated fractionation as part of the hydrotreating pathway and EPA's guidance states that mass and energy balance data is only required for new processes, Texmark and Neste provide mass and energy balance data specific to the fractionation step below for each renewable diesel feedstock that is contemplated. Upstream mass and energy balance data has not

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[13] See, e.g., 43 Fed. Reg. 14190, 14199 (noting that "our analysis of GHG emissions from the hydrotreating process is based on the mass and energy balance data in Pearlson (2011)"). The cited Pearlson document includes distillation/fractionation as part of the hydrotreating process.

been provided for the renewable diesel and diesel type 1 feedstocks because these feedstocks will be produced via a previously evaluated Table 1 pathway.

Texmark and Neste seek approval for use of two distinct renewable diesel feedstocks, "Renewable Diesel Type 1" and "Renewable Diesel Type 2." Both of these renewable diesel feedstocks meet the definition of "non ester renewable diesel" at 40 CFR 80.1401, with Renewable Diesel Type 1 meeting the ASTM D 975 Grade No. 1-D specification, and Renewable Diesel Type 2 meeting the ASTM D 975 No. 2-D specification.[14] Given the higher jet fuel yields from fractionation, Texmark and Neste intend to primarily use Renewable Diesel Type 1, although petitioners would like the flexibility to use either renewable diesel feedstock.

Mass balance:

Inputs			Mass (kg/hr)	Volume (m3/hr)	LHV (MJ/kg)
	Feedstock	Renewable Diesel Type 1			43.9
		Renewable Diesel Type 2			43.9
	Chemicals	Antioxidant	Exemption 4		
		Anti-Static Additive			
Feedstock	Outputs	Product	Mass (kg/hr)	Volume (m3/hr)	LHV (MJ/kg)
Renewable Diesel Type 2	Fuel produced	Renewable Jet Fuel			44
	Co-products	Renewable Diesel			43.9
		Light Hydrocarbons			45.3
Renewable Diesel Type 1	Fuel produced	Renewable Jet Fuel			44
	Co-products	Renewable Diesel	Exemption 4		43.9
		Light Hydrocarbons			0

Energy Balance:

[14] *See* Attachments 4 and 5 for Renewable Diesel Types 1 and 2, respectively.

		Input Value (mm Btu/hr)	Output Value (mm BTU/hr)
Feedstock	Renewable Diesel Type 1	Confidential Business Information Exemption 4	
	Renewable Diesel Type 2		

3. Historical Process Data

No historical process data is available for fractionation as neither Texmark nor Neste has previously conducted this process with either renewable diesel feedstock. The mass and energy balances were simulated specifically for the Texmark facility with Aveva's Pro/II process engineering software. This process simulator is very similar to Aspen Plus, which was the basis for the hydrotreating mass and energy balance data previously relied upon by EPA.[15] A detailed spreadsheet of the analysis is attached. The different renewable jet fuel scenarios are similar to the analysis EPA previously conducted for max jet vs. max diesel in the 2013 Pathways I rule.

4. Information for New Production Processes

N/A

i. Energy Saving Technologies or Other Process Improvements

N/A

Ii. Request for Special Provisions

N/A

Iii. Processes that Use Renewable Fuel Inputs

Although this section of the guidance is listed under "new production processes" and EPA has previously evaluated hydrotreating as discussed above, Texmark and Neste below provide specific information on the types of renewable fuel used, the suppliers of such fuel, and the fate of the renewable fuel after it undergoes the conversion process.

As noted previously, the renewable diesel will be produced from the hydrotreating process at EPA-registered Neste facilities and then fractionated into two streams: renewable jet fuel as main product and renewable diesel as coproduct. Neste will retain control of the renewable fuel feedstocks until delivery to Texmark's facility.

For Renewable Diesel Type 1, the simulated yield is Ex. 4 jet and majority of the remainder as renewable diesel fuel meeting ASTM D975, with a small amount of production of light hydrocarbons. For Renewable Diesel Type 2, the simulated yield is Ex. 4 jet and majority of the rest as renewable diesel fuel, with a small amount of light hydrocarbons generated. More detailed information on the

[15] Pearlson, M., N. 2011. A Techno-Economic and Environmental Assessment of Hydroprocessed Renewable Distillate Fuels at 3 (noting that "Aspen Plus was used to model bio-refinery operations and supporting utilities. Material and energy balances for electricity, carbon dioxide, and water requirements as well as economic costs were obtained from these models.")

fate of the renewable fuel feedstocks can be found in the mass balance table in Section E.2 and in Attachment 2.

5. Other Relevant Information

N/A

F. Feedstock

1. Type of Feedstock

The proposed feedstock for production of renewable jet fuel is renewable diesel produced by Neste from globally sourced renewable biomass pursuant to approved hydrotreating pathways under Table 1 of to 40 CFR 80.1426. The hydrotreating process for the renewable diesel feedstock converts lipids into fuel. The lipids such as mono, di, triglycerides are converted to a hydrocarbon chain in the range of diesel and jet fuel.

Specifically Neste seeks approval of a pathway to generate biomass-based diesel (D-code 4) Renewable Identification Numbers ("RINs") for renewable jet fuel derived from renewable diesel feedstock that was produced from the following renewable biomass feedstocks currently approved for production of renewable diesel from the hydrotreating process under Pathway F of Table 1 of 40 CFR 80.1426: soybean oil, biogenic waste oils, fats, and greases ("biogenic waste FOGs"), non-food grade corn oil, algal oil, and camelina sativa oil. Neste also seeks approval for a pathway to generate advanced biofuel (D-code 5) RINs for renewable jet fuel derived from renewable diesel produced from the following feedstocks currently approved for the production of renewable diesel by any process (including hydrotreating) under Pathway P of Table 1 of 40 CFR 80.1426: non-cellulosic portions of separated food waste and non-cellulosic components of annual cover crops.

2. Information for New Feedstocks

N/A

G. Coproducts

1. Technical Description

There is one other significant coproduct from the fractionation process which is renewable diesel. Renewable diesel is mixture of straight and branched paraffinic hydrocarbons with typical carbon numbers between C_{15} and C_{18}. The fuel is practically free of aromatics and combusts cleanly, thus reducing emissions. The fuel is considered a complete drop-in for fossil diesel and meets both EN 15940:2016 and ASTM D975 for paraffinic diesel fuels.

Insignificant co-products include a small amount of light hydrocarbons when using either Renewable Diesel Type I or Renewable Diesel Type 2.

2. Market Value

Renewable diesel is often valued at a premium to fossil diesel, as renewable diesel is established as a premium fuel with superior qualities than that of fossil diesel as a result of the feedstocks and advanced production technology. Federal and state incentives (RINs, LCFS, Blender's Tax Credit) impact the market value of renewable diesel, often encouraging the fuel to be at parity with fossil diesel.

3. Coproducts Used as Livestock Feed

N/A

H. List of Attachments

1. **Neste 2017 Annual Report**
2. **RJF Production Process Flow Map**
3. **Mass and Energy Balance Information**
4. **RD Type 1 Feedstock Specification Sheet**
5. **RD Type 2 Feedstock Specification Sheet**